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Construction Business Process Reengineering (CBPR): A Case Study of Construction Organizations in Malaysia

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Abstract

Business Process Reengineering (BPR) is currently one of the most popular catchwords. Companies hope to break the "magic triangle" of costs, time and quality by streamlining their business processes. So far, most BPR projects have concentrated on stationary industries, mainly manufacturing. Others, such as the construction industry, have not gained as much attention yet, even though there is a high need for reducing costs and improving the effectiveness in this industry. Increasing customer demands towards quality, speed and flexibility, tough competition from international companies, and reduced public spending have created a difficult situation for many construction organizations in Malaysia. In order to adopt BPR within construction industry and prevent from lagging behind other sectors, this study theoretically assessed effectiveness and deficiencies of the 'traditional' organizations as well as the factors that cause those effects in comparison with the 'effective' organizations based on the BPR concepts. By contrasting what are found in 'effective' organizations but not found in' traditional' organizations, critical attributes that contribute the most to successful adoption of BPR were identified so that the improvement steps for applying BPR can be suitable focused. The validated findings indicated remarkable contrast between 'traditional' and 'effective' organizations. Five critical aspects including establishment performance measurement system, empowerment of employees, participation of top management, innovative organization, and information technology (IT) were found to be the major differences to be applying BPR..

Keywords : *Business Process Reengineering (BPR), 'effective' organization, 'traditional' organization, innovative organization.*

1. Introduction

The Business Process Reengineering (BPR) is a concept that has been in operation in the manufacturing industry for a number of years. It frequently figures out as moving an organization away from its traditional functional based to process based structures (Nelson et al., 1999).

Realizing the contribution of BPR in manufacturing industry, there is question whether this approach can be introduced or implemented in construction industry to ensure its capability to compete with other sectors. Betts and Wood-Harper (1994) introduced re-engineering construction, as a new management research agenda is less clear. Meanwhile, Nelson et al. (1999) realized that BPR is one of the new buzzwords in construction and pertain to all borrowed ideas from manufacturing.

Generally, the term of BPR defined by Anderson Consulting (2000) is the fundamental reexamination, redesign, and implementation of a business process or processes. It has been portrayed as a revolutionary set of principles that can be used to achieve large-scale productivity and efficiency improvement. Analyzing the place of some of its core principles within the way construction management research is evolving shows there to be many similarities (Betts and Wood-Harper, 1994). With this approach, the study carried by Songer et al. (2000) under situational reengineering illustrated that changing work processes and providing appropriate cultural environment can result in significant schedule reduction (35%) with no increase in project cost.

Unfortunately, most Malaysia owners and contractors faced with the drastic consequences of a "crisis " often accomplish projects whose short schedules, tight budgets, or technical complexity requires adoption of

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extraordinary approaches to design and construction especially during the current worst economic period in 1997. Severe declination of the Malaysian GDP and construction growth rates shown in **Figure 1** has originated business failures in many organizations. Subsequently, many construction companies have experienced with business failures while the other still struggling in low-demand market.

Although many external factors such as larger private sector participation in infrastructure projects, increasing vertical integration in the packing of construction projects, and increased foreign participation in domestic construction (Green et al., 1997), many construction organizations are still ruled by the same old management and organization practices or processes. The BPR provides the new management approach in those highly competitive environments in order to keep construction from lagging behind other sectors.

2. Business Process Reengineering (BPR)

Whilst BPR is a relatively new overall concept, already various practitioners and commentators have created their own definitions. To start, the definition given by Hammer and Champy (1993), who have perhaps done the most to popularize the concept within the ranks of western management, is given:

"Reengineering is the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service, and speed" (Hammer and Champy, 1993).

Based on the **Figure 2**, reengineering unique emphasize on people, process, and technology. According to Hunt (1996), people are the critical mass in terms of reengineering implementation. More than 50 percent of BPR efforts is tied to management leadership and to team member and co-worker understanding of how organization can implement multifunctional process assessment teams and emphasize quality management to effect change in business processes. Approximately 45 percent or reengineering effort is process mapping, process understanding, process elimination, and process simplification driven. The balance of 5 percent is applied to the use of new or better process analysis information technology. As **Figure 2** shows, the two key implementation elements are applying multifunctional process assessment teams and adopting quality management principles from the bottom up to evaluate and significantly change business process.

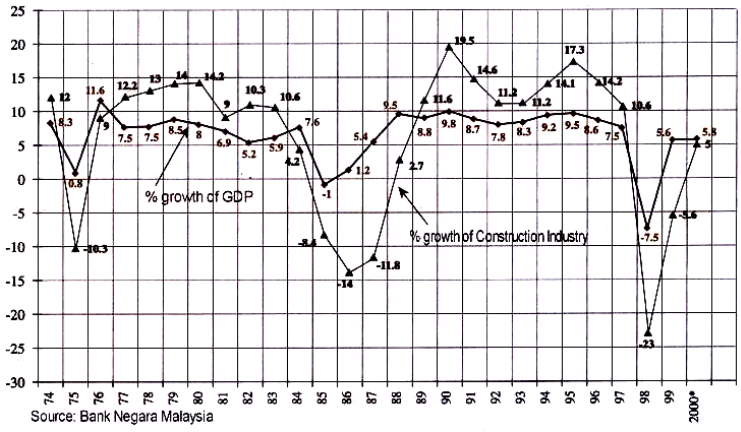

Figure 1. Malaysia GDP and construction growth rate (Bank Negara Malaysia, 2004)

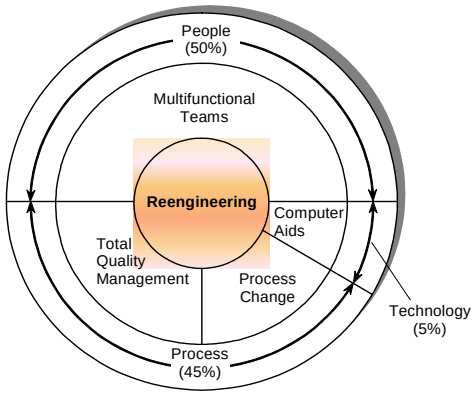

Figure 2. Reengineering emphasize on people, process, and technology (Hunt, 1996)

3. Developed Model of CBPR: an Integrated Overview

Theoretically, BPR is a change management concept to provide platform for organization for business transformation so that they can survive and strengthen their competitiveness within highly dynamic environment. The concept of Construction Business Process Reengineering (CBPR) approach has greatly different from researcher's point of view. Hence, interpretations of CBPR theory are made independently without integrating or aligning important element of organizational theory, process innovation, and information technology, which are crucial for breakthrough success of CBPR. Because of complicated nature of construction organization where there are competing and diverging business practices, cultures, structures, and technologies (Love and Li, 1998) it is necessary to develop an understanding of each element and identify measures that enable efforts and breakthrough success of adoption CBPR. Without clear-defined measures, identification or critical factors of CBPR implementation to construction organization cannot be achieved, hence creates barriers for introducing CBPR within construction organizations. Thus, a model of CBPR has been developed in the study as shown in **Figure 3** which covers three main parts namely organizational aspects, process innovation, and technology as a platform for adoption CBPR.

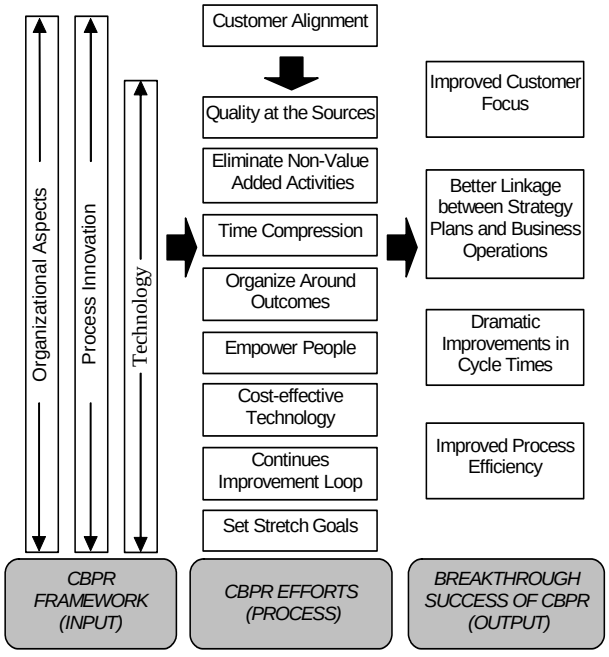

Figure 3. Developed model of CBPR for construction organizations

4. Pre-Survey of Existing Organizations

To solidify a specific set of objective, a pre-survey of CBPR within Malaysian construction organization was preliminarily conducted. Since the CBPR becomes unprecedented construction management approach, there is the need to identify the inner strength and capability of construction organizations for implement CBPR (mature). Hence, prior implementation of CBPR, any changes within construction organizations must be surveyed and, in turn, the factors obstacle those to change will be determined and the extent of change for their organization can be measured. As a result, the critical elements contribute to the most of successful to implementing CBPR will be subsequently identified. The results of the pre-survey indicated that the construction organizations have not much been changed from the past. Out of forty-five organizations of respondents, only five organizations have intended to change of their business processes due to problems during operations. Although the desire to implement CBPR within construction organizations are vary, there are two types of organization can be classified. Firstly, 'traditional' organization, which commonly found in most organizations, is the organization that has less or never considers to change, therefore, posed lack of interest to implement CBPR due to organizational resistance. Secondly, 'effective' organization is the organization that has been seriously desired to change which leads them to prefer CBPR as an important management approach in order to cope with competitive environment and create flexibility to react within dynamic environment. This type of organizations, unfortunately, is exceptionally found in a few organizations and posed well-established organizational aspects and technologies.

5. Objectives

To obtain better understanding of how existing organizations in real practices are being operated and thereby formulate focal aspects for improvement, the specific objectives of this paper were to:

- Conduct a comparative assessment between 'traditional' and 'effective' organization based on the developed model of CBPR including CBPR framework, CBPR efforts, and breakthrough success of CBPR.
- Identify critical attributes that most contribute to the organizations successfulness in implementing CBPR by contrasting what are found in 'effective' organizations but not found in 'traditional' organizations.

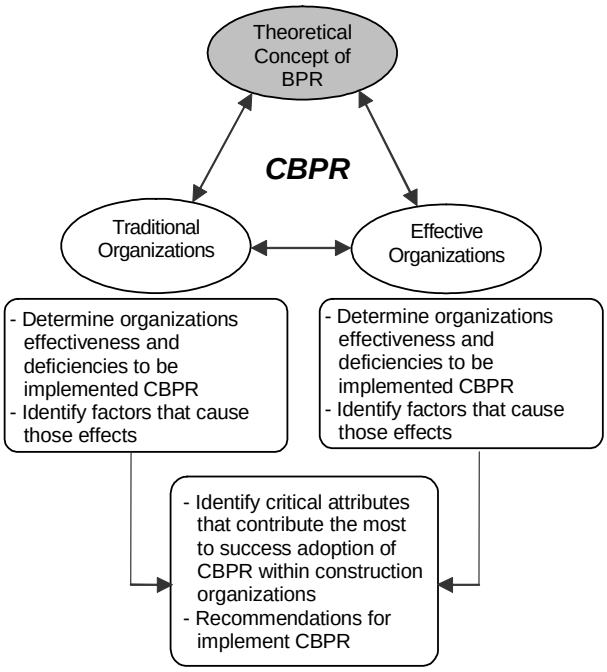

Figure 4. The objective diagram

Based on **Figure 4**, the objectives of this study are simplified in Objective Diagram.

6. Methodology

Qualitative research, particularly 'case study', that persuades through rich depiction and strategic comparison across cases (Firestone, 1987) was selected as the key methodology in this study. For cases sampling, the 'theory based' and 'typical case' strategies proposed by Kuzel (1992) and Patton (1980) was grounded for selection the cases of 'effective' and 'traditional' organizations respectively. In so doing, two cases of each organization type are sampled since 'multi-case' sampling can add more confidence to findings. According to a replication strategy (Yin, 1991), if a finding holds in one setting and, gives its profile as well as holds in a comparable setting but does not in a contrasting case, the finding is more robust. The profiles of the sampled organizations are given in **Table 1**. It should be noted that the names of the cases have been changed by randomly assigned the sequence namely A, B, C, and D for confidentiality and unbiased analysis.

7. Measure Identification of CBPR within Construction Organizations

Based on the integrated view of CBPR as shown in **Figure 3**, this section selectively elaborates substantial aspects and essence of each component, thereby identify measures that enable model evaluation. To remain continuity, comparative discussions of the assessed results among the four cases is also been presented. This section consists of two main parts including (1) CBPR framework, and (2) CBPR efforts and breakthrough success of CBPR.

7.1 CBPR framework

This part consists of three substantial factors, namely organizational aspects, process innovation, and technology. The essence of these factors was widely discussed by many researches Tatum (1987); Venkatraman (1994); Laborde and Sanvido (1994); Betts and Harper (1994); Ghoshal (1995); Mische (1996); Nelson et al. (1998); Pollalis (1996); Kagioglou et al. (1998); Love and Li (1998); Murray (2000); Feurer et al. (2000)). It is well accepted that these factors must be appropriately employed as a critical frame for breakthrough success of CBPR.

7.1.1 Organizational aspects (McKinsey's 7S Model)

The measurement of CBPR within organization is identified according to McKinsey's 7S model. It consists of seven important elements namely structure, system, shared value, strategy, staff, skills, and style. Because it encapsulates the key components of an organization and has shared values (or culture) at is center, McKinsey's 7S models was used as a framework to assess CBPR in organization.

1) *Organizational Structure* - The necessity of cross-functional structure to implement CBPR was described by many researchers (Love and Li, 1998; Roberts, 1994) and the flatten structure contribute to the existing of cross-functional teams within organizations. According to Hunt (1994), many successful businesses are adjusting their formal business organizational structures and reporting relationships to better support CBPR

Table 1. Profile data for the organizations studied

	Case A	Case B	Case C	Case D
Established Year	1985	1980	1960	1979
Specialization	Civil Work, Highway/ Road Works, Building Works	Building, General Construction, Road/ Highway Works	Civil Work, Highway/ Road Works, Building Works	Building, General Construction, Industrial Plant
Share Capital	RM 50,000,000.00	RM 10,000,000.00	RM 100,000,000.00	RM 20,000,000.00
Paid-up Capital	RM 10,000,000.00	RM 7,000,000.00	RM 4,000,016.00	RM 8,000,000.00

initiatives. Love and Li (1998) stated, "CBPR is currently seen as a change mechanism for permanent organizations and much more difficult to apply to project organizations where there are competing and diverging business practices, cultures, structures, and technologies". They further suggest that "…. an alternative strategy for re-engineering in construction is needed that fundamentally focuses on eliminating functional tasks because they typically manifest in confrontation and conflict"

2) *Organizational Skills* - Skills improvement within organization is a part of requirement for successful of BPR implementation. Since many of construction companies underemphasize the important aspects of training within organizations, Nelson et al. (1998) claimed that the lack of proper training channels for both management and staff is a part of barrier to introduce CBPR within construction organizations

3) *Organizational Staffing* - In organizational staffing context, CBPR is often linked to new rewards systems. Davenport (1993) refers to 'gain-sharing', 'lateral promotion' and a move from 'role title to process title', and variety through 'work role rotation'. Lifetime employment, he believes that encourages employees to redesign the processes to eliminate their own job. Similarly, Songer et al. (2000) under situational reengineering also believe that work role rotation in construction can ensure breakthrough success of CBPR.

4) *Organizational Style* - According to Hall (1999), reengineering approach is two-fold. Firstly, it requires handing down of power from management levels to employees (assumes power is a commodity that can be handed around at will). Secondly, it requires changing values and beliefs of those being empowered so they operate with the new values (individuals are then regulated through these standard organizational values).

5) *Organizational System* - According to Hammer and Champy (1993) one of the main criteria for reengineering success is to get all the way around the business system diamond. The business system diamond identifies the relationship between business processes, jobs and structures, management and measurement systems, and values and beliefs.

6) *Organizational Strategy*- A part of success implementation of CBPR within organization is alignment of business processes to strategy goal so that all employees can move in one direction and focus their objectives toward company's strategy (Feurer et al., 2000). In other hand, the strategies must be defined in such a way that enables understanding and motivation of employees in order to align the work force with them.

7) *Organizational Shared Value* - The core or fundamental values that are widely shared in the organization and served as guiding principles are important for breakthrough success of CBPR. These values have great meaning because they focus attention and provide a broader sense of purpose. In addition, shared values create the goals of all employees (Morris and Brandon, 1993) and known throughout the organization (Hammer and Champy, 1993; Davenport, 1993).

7.1.2 Process innovation

Innovation is the key to competitive advantage and reengineering (Mische and Bennis, 1996). According to Laborde and Sanvido (1994), the following elements were found in the innovative construction organizations:

1) *The Company Strategic Plan* - This is the "key" starting point of an innovative company. The company must develop a clear vision that gives a sense of purpose and direction to which every one can relate. It must address the organization's need and support of innovative ideas over proven technologies.

2) *Long-Term Perspective* - There must be an emphasize on long-term benefits versus shorter-term profit. An innovative company must be willing to accept a moderate loss on a current project that is being used experimentally with a new technology.

3) *Short Lines of Communication.* - Top management should be readily accessible to all. Organization rigidity and multiple hierarchical levels are barriers to innovation. It is important to achieve the small-company-type, efficient and informal communication networks, which provide fast responses and easy adaptation to change.

4) *Suggestion and Reward Programs* - It is necessary to foster, stimulate, and reward the creativity of all employees. A formal suggestion programs shows that the company cares about its people's opinion.

5) *Innovation Bulletins, Journals, and Seminars* - It is very important that all employees keep up to date with new developments. The company can encourage this by subscribing the job sites to trade

journals, by sending people to industry seminars, by holding their own internal presentations, and by posting innovation bulletins on a regular basis.

7.1.3 Technology

Technology is the most important keys to improve efficiency (Turban et al., 1999). In CBPR, technology is closely related to information technology (Betts and Harper, 1994). IT is fundamental to the competitive posture of the organization and essential to any reengineering process (Mische and Bennis, 1996). It is the enabling agent that provides the necessary infrastructure that links the organization together and supports process innovation, organizational integration, and cross-functionalization. Without enabling technology solutions, process innovation and quantum results cannot be achieved.

Turban et al. (1999) suggest the ways that technology can support a business processes as follows:

- Increasing speed
- Storage and Retrieval
- Communicating
- Controlling Process Tasks and Improving Quality
- Monitoring
- Supporting Decision Making

7.1.4 Assessed results of CBPR framework

After findings from organizations auditing are obtained as shown **Table 5**, possible effects – effectiveness and deficiency – of three important elements of CBPR must be analyzed, aligned, and concluded. In order to facilitate data analysis and enable reliable conclusion, these effects were firstly pre-identified based on many sources such as citation

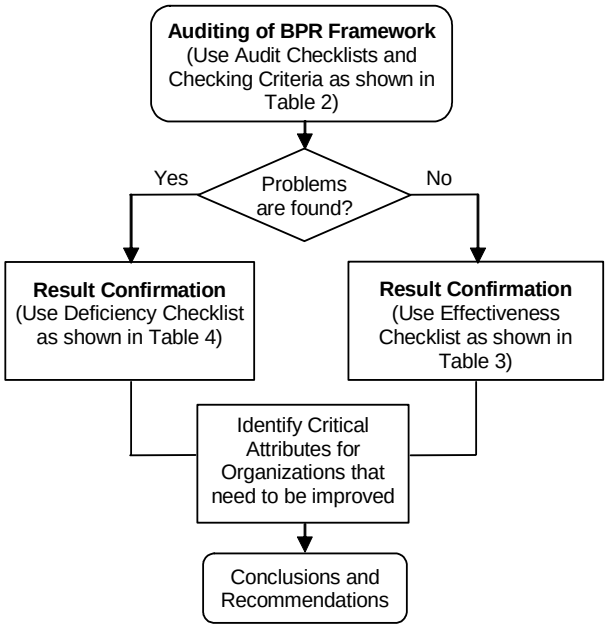

Figure 5. Organizations auditing procedure for CBPR

in many research studies, discussion with experts during pre-survey, and interpretation from theoretical concepts. Then, based on the auditing procedure illustrated in **Figure 5**, the pre-identified effects must be confirmed by the informants whether they have such effectiveness and/or are facing with such deficiencies or not so. Subsequently, the respondents are requested to verify whether CBPR efforts can be implemented within organizations. Ultimately, these result confirmations will be considered again so that trustworthy conclusion can be drawn. The following are the results of discussion:

Table 2. Technology audit checklist (example)

Code	Subject	Description/(Effect)	
T	**TECHNOLOGY**		
TI	**INFORMATION TECHNOLOGY**		
TI.01	Shared database being utilized	□ Yes (m1)	□ No (M1)
TI.02	Telecommunication network is employed (e-mail, LAN network)	□ Yes (m2)	□ No (M2)

Table 3. Checklist of effectiveness from proper CBPR framework (example)

Date: _____ Location: _____

Code	Description	Y	N	N/A
O	**ORGANIZATIONAL ASPECTS**			
t1	Functional tasks are eliminated			
	Every worker would become part of a multi-functional team, which lead of increasing of responsibility and accountability at the lowest levels. Middle level management can be eliminated hence create flexibility and cross-functional teamwork.			
k1	Team-building activities are employed			
	Team-building activities allow non-management team members to participate in project planning hence improve interpersonal relationships among key stakeholders. As a result, leadership skills can be improved to encourage team members in decision-making process.			

Table 4. Checklist of deficiency from improper CBPR framework

Date: _____ Location: _____

Code	Description	Y	N	N/A
O	**ORGANIZATIONAL ASPECTS**			
K3	Performance report is not utilized			
	Performance report is not providing to measure employees performance. As a result, employees become demotivate to improve their skills.			
K4	There is no external feedback is performs based on performance report			
	There are no feedbacks are provided to the project team about their performance against project plan hence, it is difficult to identify and develop better ways of doing project works.			

***Organizational Structure**:* The company in case A and C are established as a pure organizational structure. As a parent company, they have several branches to operate several projects in different places. The project manager has full line authority over the project. Though the project manager must report to a senior executive in the parent organization, there is a complete work force devoted to the project. The project manager is like the CEO of a firm that is dedicated to carrying out the project. In term of elimination of functional tasks, all members of the project work force are directly responsible to the project manager. There are no functional division heads whose permission must be sought or whose advice must be heeded before making technological decisions. The project manager is truly the project director. Unlike case B and case D the company can be classified as a functional organizational structure. There are several divisions operates within organization which consists of structural, geotechnical, and environmental division. The structure of organization is highly specialized and routine operating task, which very formalized communication throughout the organization. The B and D company, therefore, reliance on the functional basis for grouping tasks and relatively centralized power for decision-making. Since there is complex organizational hierarchy is established, the functional tasks cannot be eliminated, hence, the employees do not have the capability to cross-organizational hierarchy to perform others jobs. Such an organizational arrangement does not facilitate a holistic approach to the project

Organizational Skills: Through employment of team-building activities in case A and C, non-management team members such as project engineers and supervisor can participate in project planning phase. There are also training packages are periodically provided by company A and C, which consists of construction management trainings, safety officer trainings, administrative and technical training. Construction management trainings are given to project engineers to enhance their performance through project planning skills by providing Primavera (P3) and Microsoft training programs. Since the performance report can be known within organization, it can provides feedback to the project team about their performance against project plan and, in turn, facilitates identifying and develop better ways of doing project works. For instance, the C Company provides performance report periodically to give the feedback to employees about their progress performances. Since, subcontractor performs most of projects, the company provides an evaluation form to assess involvement of subcontractor on-site works. As a part of ISO 9002 requirement, there is the need to keep those records for future projects about performance of subcontractors. In contrast, the B and D Company do not have activities, which allow non-management level to involve in planning processes. Since, employees involve in highly specialized and routine operation task, therefore every employees do the same jobs without any involvement with others activities. Trainings also are not consistently provided to employees to improve their skills. The B Company relies on the experiences of management and staff to perform their tasks. In case B and D also employees have not capable to improve their skills and performances. Due to performance report has not been provided, employee's skills and performances cannot be evaluated. Although this aspect cannot be done, the project engineer of B Company articulated that "*the performance of our employees are based on the numbers of jobs have been done and the length of duration taken by employees to finish their jobs"*. Meanwhile, an executive management of D company said that "*We do not need performance report to assess those employee who has long-term experiences because they feel uncomfortable with that stuff"*.

***Organizational Staffing**:* In case A and C, there is a reward and recognition system has formally been utilized. Since the A company operates as a parent company, the system has been centralized to the head office. Therefore, there is no system practically has been used for projects itself. This, in turn, unable employees to give feedback and communicate between head office and on-site work. Since there is performance report has been effectively employed in case A and C, most of the employees have been evaluated respectively and performance records have been kept as a basic part of ISO 9002 requirements.

Unlike organizational skills, employees that have similar competences and considered most active project team members will be placed in the similar project location to enhance collaboration between team members. The executive management claimed that *" it is our policy to put the most active team members in same project location to enhance collaboration between them"*. The *"teamwork, unity, loyalty, integrity and professionalism"* is part of company's mission. In term of lifetime employment, the A and C Company reassigns appropriate employees (designer or engineer) with different roles to execute certain activities. Although the project engineers are responsible to control the projects, at the same time, they also have been given authority as project planners. In so doing, it can be done by breaking down the boundaries between positions by rotating assignments within teams weekly, and by holding unit wide meetings twice a month to discuss improvements to the processes. Unlike case A and C, the B and D Company informally established their own reward and recognition system. Rewards are given to the employees based on the profit acquired by the company. Therefore, the system is not consistently utilized and no system is formally employed within the projects. Two reasons behind this can be cited. Firstly, the company's policy is getting job done by increasing incomes rather than outcomes for spending money for rewarding employees. Secondly, there is no budget allocation for utilizing this system and, in turn, the rewards depend on the incomes from the projects. In term of lifetime employment, employees within B and D Company who posed long-term experiences are not willing to rotate their works with other employees. There are two reasons behind this can be identified. Firstly, since most of the projects are short-term focused on prices, it is difficult to employ this aspect. An executive management claimed that *" we do not have enough time to utilized work role rotation between employees. They must focus on their own job rather than other jobs in order to get jobs done on time frame"*. Secondly, due to gaps exist between employees in term of experiences, it is difficult to place those who has long-term experiences. Although this aspect cannot be utilized, the B Company employs multitasking employees to expedite certain jobs without any relocation of employees.

Organizational Style: In case A and D, the capability of organizational style influences execution of CBPR can be considered ineffective. The way top management make decision based on top-down approach is the major reason obstructs implementation of CBPR within organization. This, in turn, creates highly operational task and barrier for adoption cross-functional teamwork. In addition, informal meeting has been practiced by project managers in order to identify any problems during project execution. As a result, the people who directly support the business process can be given a central role in analyzing and redesigning the process. Hence, those who own and control the process will likely have the best ideas for improving the process. Unlike case A and case D, the executive management of B Company employed participatory approach to make decisions. Hence, the capability of breakthrough success of this company to implement CBPR can be considered higher. As a result, participatory approach lead to increase involvement of employees and, in turn, reduces the resistance to change. In addition, it shows that the company is capable to hand down of power from management levels to employees. In this case, most of project managers spent their time in the field. This, in turn, creates open channels for employees to give feedback on-site work.

Organizational System: For measuring performance of the employees, the measurement auditing has been employed within the A and C Company. These performance measurements are implemented in the annual appraisal system (APIS) – measurement of the employees, in order to link incentives to business process related performance and there are integral parts of the basis for the ISO certification. In addition, several Key Performance Indicators (KPI) have been developed to help identify performance deficiency along the key result areas such as audit plan, purchasing, and project management. The objectives of the company are linked to each of the key elements of measurement. The quality system within organization is also well established. By getting ISO 9002, the project can be better controlled according to the policies and procedures. Most of transaction within head offices and on-site works are systematically done through documentation. In this case, the quality system is implemented through project quality plan prepared by site quality co-coordinator (Quality Officer). In contrast, the B and D Company do not have formal or standard measurement system to assess their employee's performance and business processes. Only experiences of employees and timing for completing the projects become the main elements to measure the quality of works. In term of information system, the project manager in B and D Company carries out the actual planning and project analysis manually and the results are only partly documented as input to the management software. The majority of project managers are dissatisfied with the project management software package provided by the company. They claimed that the package provided is too complex for their scheduling needs while the others think the package provided is too complicated and many choose to make layouts of schedules with packages intended for other purposes such as spreadsheets.

Organizational Strategy: In case A and C, the company's strategy known throughout organization will lead employees to focus their direction toward that strategy and provide clear direction to all employees. The goal for adapting the business process to the change environment is part of company's strategy. Hence, provide fast responses and easy adaptation to change. Due to customer alignment to organization's strategy lead employees directly focus to meet customer satisfaction. In contrast, unknown the company's strategy throughout case B and D will lead employees to focus their direction in the wrong way without clear direction to all employees. The goal for adapting the business process to the change environment is not part of company's strategy. Hence, it is difficult to provide fast responses and easy adaptation to change. Goals are not set according to organization strategy will drive employees to focus in different direction, which means hinder employees to improve overall organization performance.

Organizational Shared Value: Common values within case A and C can be known. The A company has vision *"To be the leader and model corporate participant in the development of the nation's infrastructure"* which is shared among employees. The quality culture is part of company's mission through *"teamwork, unity, loyalty, integrity and professionalism"*. *"Dynamic, Innovative, and Progressive"* is the common values, which can be known among employees within the C Company. In contrast, there are no common values exist within B and D company. Employees work without common values and shared vision, which discourage them to collaborate each other and perform effective teamwork. Without core or fundamental value that are widely shared and known within organization, employees cannot work together with one direction and focus around goals and outcomes

Process Innovation: Potential for A and C company to innovate is considered high compared to B and D company. The company's policy in A and C Company is part of commitment of top management. The applications of new technologies and efforts toward innovation have been mentioned within company's policy. As a parent company with several project, distribution of company's policy enable employees to link their objectives and goals. Thus, the company has a clear vision that gives a sense of purpose and direction to which every one can relate. In case A and C, most of the projects are long-term period which taken five year to be completed. The capability to establish innovative organization can be considered high and, in turn, allow long-term investment from company to enhance overall organizational performance. Due to acquirement of ISO 9002, continuous improvement is imperative to consistently innovate organization and thus enable company to adapt with changes. In contrast of A and C Company, either in company's policy or company's plan, there is no existing of commitments from top management to cultivate innovation among employees. In case B and D, no formal plan was established and mentioned within company's policy and employees tend to misunderstand and company's plan was unknown or solely known in abstract level. Since there are no long-term projects were acquired by the company B and D, capability to established innovative organization is considered low. Only medium-sized projects have been executed.

Technology: The A and C Company has their own policy toward introducing as much office and on-site automation as possible. Accounting and finance, transaction processing, payroll, and personnel are very highly dependent on the usage of IT. The use of Primavera (P3) and Expedition is also high in areas of project planning and scheduling. The organization does have a formal budget for IT for each of projects. However, the budget is flexible in the sense that the expenditures and investments on IT are done based on the urgent need and requirements for them in the organization. In case A, shared database can be classified as decentralized information system. In other hand, it is based on the principle that that each area of activity owns it own systems. Data storage is local, and interaction between areas of activities is based on CMI–Computerized Message Interaction. The information stored in the local systems is owned by the respective area of activity and cannot be manipulated, or even accessed, by the other areas. In case A and C also, internet is vital for the company to facilitate information flows between management and staff. The executive management of A Company stated that *"Almost all of transactions process between head offices and on-site have done through internet"*. Furthermore, most of employees communicate through e-mail and, in turn, increase collaboration between them. Unlike case A and C, the B and D Company do not have a clearly outlined IT policy. Although they believe in the benefits of IT, implementation has been slow. This is obvious from the fact that none of the main functions of the company's organization is identified as areas where IT is highly used. Even in areas such as payroll and accounting, IT use can only be considered ineffective. In addition, there is no budget allocation for investing in IT. Because of limited budget and resources, requirement of using Primavera (P3) as standard software in project planning and scheduling cannot be met. In term of database, most of information about the projects has been kept locally, thus, shared database can be classified as decentralized information system.

Table 5. Overall summary of organizational aspects (McKinsey 7'S Model), process innovation and technology

Code	Subject	Case			
		A	B	C	D
U	**ORGANIZATIONAL STRUCTURE**				
U.01	Type of organization structure are selected based on:	Pure Structure	Functional Structure	Pure Structure	Functional Structure
U.03	Functional tasks is eliminated	Yes	No	Yes	No
K	**ORGANIZATIONAL SKILLS**				
KA	**TEAM-BUILDING ACTIVITIES**				
KA.01	Team-building activities are employed	Yes	N/A	Yes	N/A
KT	**TRAINING**				
KT.01	Trainings are provided to employees	Yes	No	Yes	No
KP	**PERFORMANCE REPORT**				
KP.01	Performance report is utilized	Yes	No	Yes	No
KP.02	External feedback is performs based on performance report	No	No	No	Yes Ineffective
F	**ORGANIZATIONAL STAFFING**				
FR	**REWARD AND RECOGNITION SYSTEM**				
FR.01	There is effective reward and recognition system is being utilized	Yes	Yes Ineffective	Yes	Yes Ineffective
FR.02	Project has its own reward and recognition systems	No	No	Yes	Yes Ineffective
FC	**COLLOCATION**				
FC.01	Most active project team members placed in the similar physical location	Yes	N/A	Yes	No
FL	**LIFETIME EMPLOYMENT**				
FL.01	Work role rotation being used	Yes	No	Yes	N/A
FL.02	Multitasking by craftsmen	Yes	Yes	Yes	Yes
FL.03	Relocated employee to:	Both	N/A	Field offices	Field offices
Y	**ORGANIZATIONAL STYLE**				
Y.01	The way top management make decision	Top-down	Participatory	Participatory	Top-down
Y.02	How do project manager spent their time?	Informal meeting	In the field	In the field	Informal meeting
S	**ORGANIZATIONAL SYSTEM**				
SM	**MEASUREMENT SYSTEM**				
SM.01	Measurement system established to measure performance of business process	Yes	No	Yes	N/A
SC	**CONTROL SYSTEM**				
SC.01	Computer supply is enough	Yes	Yes	Yes	Yes
SC.02	Project management software is applicable	Yes	No	Yes	No
SC.03	Quality system being used	Yes	No	Yes	No
SC.04	There are system for structured feedback for experience	No	No	No	No
SI	**INFROMATION SYSTEM**				
SI.01	Information system effectively utilized	Yes	No	Yes	No
R	**ORGANIZATIONAL STRATEGY**				
R.01	Employees understand company's strategy	Yes	No	Yes	No
R.02	Strategy is aligned to business process	Yes	No	Yes	No

Table 5. Overall summary of organizational aspects (McKinsey 7'S Model), process innovation and technology (Advanced)

Code	Subject	Case			
		A	B	C	D
V	**ORGANIZATIONAL SHARED VALUES**				
V.01	Common values exist within organization	Yes	No	Yes	No
V.02	Labors are linked by common values	Yes	No	Yes Ineffective	No
P	**PROCESS INNOVATION**				
PE	**ELEMENTS OF INNOVATION**				
PE.01	There is management decisions concerning strategic focus	Yes	No	Yes	Yes
PE.02	There is long-term perspective	Yes	No	Yes Ineffective	No
PE.03	Short lines of communication has been adapted	Yes	No	Yes	No
PE.04	Suggestion and reward programs are employed	Yes	No	Yes	Yes Ineffective
PE.05	Innovation bulletins, journals, or seminars are provided	Yes Ineffective	No	Yes	No
IN	**TYPE OF INNOVATION**				
IN.01	External Business Structure	Long-term contracts	Short-term explicit contracts focused on price	Long-term contracts	Short-term explicit contracts focused on price
IN.02	Internal Business Structure	Flexible divisions, trust-based working relationship	Closed hierarchy, close supervision	Flexible divisions, trust-based working relationship	Closed hierarchy, close supervision
T	**TECHNOLOGY**				
TI	**INFORMATION TECHNOLOGY**				
TI.01	Shared database being utilized	Yes Ineffective	Yes Ineffective	Yes Ineffective	Yes Ineffective
TI.02	Telecommunication network is employed (e-mail, LAN network)	Yes	Yes Ineffective	Yes	Yes Ineffective
TI.03	There are decision support tools	Yes	No	Yes	No
TI.04	Wireless data communication and computers are available for employees	Yes	Yes	Yes	Yes
TI.05	Automatic identification and tracking is employed	Yes	No	Yes Ineffective	No
TI.06	High performance computing are provided	Yes	Yes	Yes	Yes

7.2 CBPR efforts and breakthrough success of CBPR

Referring to the previous part, the assessment of the CBPR framework probably enables the author to summarize effectiveness as well as deficiencies to be implemented CBPR in construction organizations. However, to acquire more confidence and richer picture, assessment of CBPR efforts and breakthrough success of CBPR has to be taken into account. Subjected to the research constraints, efforts spent in this section did not try to cope with all excessive detail in real practices yet valuable cover all critical aspects. This part is broken down into eight sub-sections as given by Anderson Consulting (2000) which consist of the followings:

1) ***Customer Alignment and Empower People:*** Assess the value of business activities as they pertain to customers to ensure that an organization is closely aligned with its customer's specific needs. Flatten corporate hierarchies, giving those who are closest to the information the power and responsibility to make decisions. Provide the knowledge, tools, and authority needed to make decisions and execute process effectively.

2) ***Quality at the Sources***: "Do it right in the first time" to minimize the need to double-check and inspect unnecessarily.

3) ***Eliminate Non-Value Added Activities***: Identify and eliminate any activities that do not provide value to either internal or external customers.

4) ***Time Compression***: Reduce process time and overlap activities whenever possible. Speeding up business cycles can reduce costs and increase customer satisfaction, which translates into intermediate steps.

5) ***Organize Around Outcomes*****:** Organize and measure people and processes around goals and outcomes, not a series of intermediate steps.

6) ***Cost-effective Technology***: Selection of technology is based on its capability for business transformation to reduce cost such as cost of operation or maintenance. Hence, the consideration of characteristic of technology is essential element for determining the successful of BPR.

7) ***Continues Improvement Loop*****:** Continually evaluates and questions all business practices to exploit opportunities.

8) ***Set Stretch Goals****:* Clearly setting of goals drive people to more concentrate on achieving it as well as improve their performance to be more challenge. In this aspect, using benchmarking and best practices is the best way to create people which resistance to this environment.

8. Assessed Results of CBPR Efforts and Breakthrough Success of CBPR

To come up with assessed results of selective important attributes shown in **Table 6**, first, general attributes of effective CBPR efforts were developed in a form of matrix and checklist to serve as a guideline for the assessment. Each attribute was identified in couple with specific checking criteria based on the large body of knowledge in both theoretical concept and standard practices. Then, managers were interviewed and related documents were gathered to identify the existence of each attributes. After that, the consequences of the model were interpreted in practical terms. For instance, if performance report is not provided to employees for reward programs, they may have no motivation to ensure breakthrough success of CBPR implementation. Finally, to add confident to the findings as well as ability to select important attributes, senior managers of each case were asked to validate the results in term of severity degree of each deficiency they are facing. The followings are the result discussion:

Customer Alignment and Empower People*:* To be successful adoption of CBPR within construction organizations, the type of organization structure can be classified as a pure structure, although the capability to adopt matrix structure within construction organization is difficult to achieve. The pure-based structure in case A and C, therefore, is considered effective construction organizational structure for introduce CBPR since its capability to shorten line of communication and ability to make swift decisions among employees is greatly enhanced. The entire project organization can react more rapidly to the requirements of the client or customer and the needs of senior management.

Quality at Sources: Organizational system within case A and C can be considered effective. Available business system diamond in both cases can contribute to successful implementation of CBPR. Not only measurement system has been aligned to customer's satisfaction, quality aspects also can be improved through effective quality system, which part of basis for the ISO certification within both cases. Moreover, according to Deming's Quality Principles, the subject of quality improvement is an important part of BPR approach.

Eliminate Non-Value Added Activities: In case A and C, work role rotation employed by the company makes responsibilities overlap by designing jobs with a relatively broad range of duties, and by having a relatively small number of job titles. In addition, using multitasking craftsmen prevent from lacking in-house staff and given impact to cost and schedule reduction under situational reengineering through project cycle time improvement. This, in turn, creates multifunctional teamwork and lead to easy adoption of CBPR within organizations through eliminating of non-value added activities.

Time Compression: The application of technology in case B and D are considered ineffective to be implemented CBPR. Interrelationship between stakeholders cannot be improved and communication between them become slowly and information cannot be sent on time to make fast and timely decision-making. Without providing all workers with a computer terminal that connected them to and e-mail network and electronic problems-reporting-and-tracking system, project managers cannot actively keep workers informed of customer, cost, and market data. Time consuming for handling information within or between head office and on-site work cannot be reduced. Manual processes, paper, forms, and traditionally structured operations cannot be replaced which lead to take much time to complete.

Organize Around Outcomes: With effective measurement system is found in the A and C Company, it facilitates to identify an organization's performance in order to attract future investment, increase share value and attract high caliber employees. Effective planned system of measurements establish how well a process is performing and to compare before and after results. Through key

performance indicator applied by the company like *"Ensure that there are less than 2 complaints received in a month"*, the customer satisfaction can be put as higher priority to be achieved. Once BPR efforts are taken, it can continue for months or years, and requires much more company resources. Therefore, it should be periodically evaluated in regard to performance results.

***Cost-effective Technology*:** The A and C Company has their own policy toward introducing as much office and on-site automation as possible. Accounting and finance, transaction processing, payroll, and personnel are very highly dependent on the usage of IT. The use of Primavera (P3) and Expedition is also high in areas of project planning and scheduling. The organization does have a formal budget for IT for each of projects. However, the budget is flexible in the sense that the expenditures and investments on IT are done based on the urgent need and requirements for them in the organization.

***Continues Improvement Loop*:** Potential for A and C company to innovate is considered high. Availability of the innovation elements in this case can contribute to establishment of innovative organizations and, in turn, facilitate for effective generation and implementation of a new idea which enhances overall organizational performance in term of cost, time, and quality which is part of customer's requirement. Process innovation closely related to quality improvement which means improvement in construction methods designed to accomplish usual construction operations or to improve the efficiency of standard operation. Continues improvement contributes to consistently innovate organization. Continues feedbacks from project stakeholders are available to improve performance.

Set Stretch Goals: Available shared values among employees keep them to work together in one direction thus links between employee's goals. In other hand, it creates goal for all employees. Both of case A and C have formal shared values, which is understandable and known among employees. The shared vision was established at corporate level and diffused company wide. Thus, both cases can be effectively utilized CBPR.

Table 5. Overall summary of organizational aspects (McKinsey 7'S Model), process innovation and technology

Critical Attribute	'Traditional' Organizations		'Effective' Organizations	
	B	D	A	C
BPR FRAMEWORK (INPUT)				
ORGANIZATIONAL ASPECTS				
ORGANIZATIONAL STRUCTURE				
- Elimination of functional tasks	×	×	✓	✓
ORGANIZATIONAL SKILLS				
- Employment of team-building activities	×	×	●	●
- Proper training channels for both management and staff	✓	✓	●	●
- Utilization of formal performance report	×	×	●	●
ORGANIZATIONAL STAFFING				
- Formal reward and recognition system	✓	✓	●	●
- Collocation	✓	✓	●	●
- Lifetime employment (Work role rotation, multitasking, and relocation staff)	×	×	●	●
ORGANIZATIONAL STYLE				
- Employment of participatory approach by top management in decision making	✓	◑	◑	×
ORGANIZATIONAL SYSTEM				
- Effective measurement system	×	×	●	●
- Effective control system	✓	✓	●	●
- Effective Information system	✓	✓	●	●
ORGANIZATIONAL STRATEGY				
- Employees understand company's strategy	×	×	✓	✓
- Strategy is aligned to business process	×	×	●	●

Table 5. Overall summary of organizational aspects (McKinsey 7'S Model), process innovation and technology (Advanced)

Critical Attribute	'Traditional' Organizations		'Effective' Organizations	
ORGANIZATIONAL SHARED VALUES				
- Existing of common values within organization	×	×	●	●
- Labors are linked by common values	×	×	✓	✓
PROCESS INNOVATION				
ELEMENTS OF INNOVATION				
- Company strategic plan	×	×	✓	✓
- Long-term perspectives	×	×	✓	✓
- Short lines of communication	×	×	●	✓
- Effective suggestion and reward programs	✓	◑	●	●
- Innovation bulletins, journal, or seminars	×	×	✓	✓
TECHNOLOGY				
INFORMATION TECHNOLOGY				
- IT policy	×	×	●	●
- IT infrastructure	◑	●	●	●
- IT training	×	×	●	●
- Customer Alignment	×	×	●	●
- Quality at the Sources	×	×	●	●
- Eliminate Non-Value Added Activities	×	×	✓	✓
- Time Compression	✓	✓	●	●
- Empower People	×	×	●	●
- Cost-effective Technology	×	×	●	✓
- Continues Improvement Loop	×	×	✓	✓
- Improved customer focus - Better linkage between strategy plans and business operations - Dramatic improvements in cycle times	×		●	

Legend:
✓ Available but has not be improved
× Not Available
● Available and has been improved effectively
◑ Available and has been improved but not effectively done

9. Conclusion

The term 'effective' was defined to designate organizations that have been seriously and continually change and willing to adopt BPR within organizations. According to pre-survey as discussed in previous section, this type of organization is exceptionally found in a few Malaysia large-scale construction organizations. The following described major reasons that contribute to successful implement BPR.

1) Establishment of Performance Measurement System.

The establishment of performance measurement system led to effectively evaluate the performance of employees and business process, which is vital for applying BPR.

- With effective measurement system is found in this type of organizations, it facilitates to identify an organization's performance in order to attract future investment, increase share value and attract high caliber employees. Effective planned system of measurements establish how well a process is performing and to compare before and after results. Through

key performance indicator applied by the company like *"Ensure that there are less than 2 complaints received in a month"*, the customer satisfaction can be put as higher priority to be achieved. Once BPR efforts are taken, it can continue for months or years, and requires much more company resources. Therefore, it should be periodically evaluated in regard to performance results.

2) Participation of Top Management in adoption of BPR

In comparison with 'traditional' organizations, more participation of top management for willing to change their business process is found in this type of organizations. Thus, they devote greater percentage to implement BPR.

- Improve individual skills may allow a specific person to perform their assigned activities more effectively as well as allow project team members to devote a greater percentage of their effort to technical activities. New processes or technologies often require making changes to the standard operations. Investing in training lead to effectively use of processes and efficient use of their capabilities.

- The company's policy is part of commitment of top management. The applications of new technologies and efforts toward innovation have been mentioned within company's policy. Thus, the company has a clear vision that gives a sense of purpose and direction to which every one can relate.

3) Empowerment of Employees within Organization

More empowerment of employees can be seemed in this type of organization lead to fulfill two critical factors of BPR; (1) those who own and control the process will likely have the best ideas for improving the process, and (2) involvement is a key strategy for overcoming the resistance to change.

- Through employment of team-building activities within organization, non-management team members such as project engineers and supervisor can participate in project planning phase, hence interpersonal relationships among key stakeholders can be improved. As a result, leadership skills can be enhanced to encourage team members in decision-making process.

- By having multitasking craftsmen, adoption of multifunctional teamwork can be easily achieved. Through effective relocation of employees in the fields and in couple of multitasking craftsmen facilitate in eliminating of non-value added activities and, in turn, improve project cycle time.

4) Commitment in establishing innovative organization

In comparison with 'effective' organization, adequate key elements of innovation are reason of willing to change for 'traditional' organizations hence efforts to implement BPR would be more important.

- Due to key elements of innovative organization are found within this company enable effective generation and implementation of a new ideas and technologies to enhance overall organizational performance in term of cost, time, and quality which is part of customer's requirement. The availability of short lines communication, long-term perspectives as well as reward system contributes to consistently innovate organization through continuous feedback from stakeholders.

5) IT as enabler tool for BPR

The commitments toward improving IT within organization are high through company's policy, available IT infrastructure as well as proper training channels both management and staff.

- Appropriateness of the established IT can contribute BPR efforts to be performed in the most effective manner. Application of IT enables customer satisfaction by dramatic improvements in cycle time. Delays in the process, whether they are deemed unavoidable or not, are a major source of discontent to the customer. IT facilitates organization to reduce and delete non-value added activities that do not contribute to the overall strategic businesses. It will consolidate and eliminate many traditional tasks, human resources, and associated costs.

10. The Mature of Construction Organizations toward CBPR Implementation

The concept of CBPR needs the mature of construction organizations for smoothly adoption and execution of CBPR efforts. This could be illustrated in the "Business Maturation Spiral" of construction organizations as shown in **Figure 6**. The Business

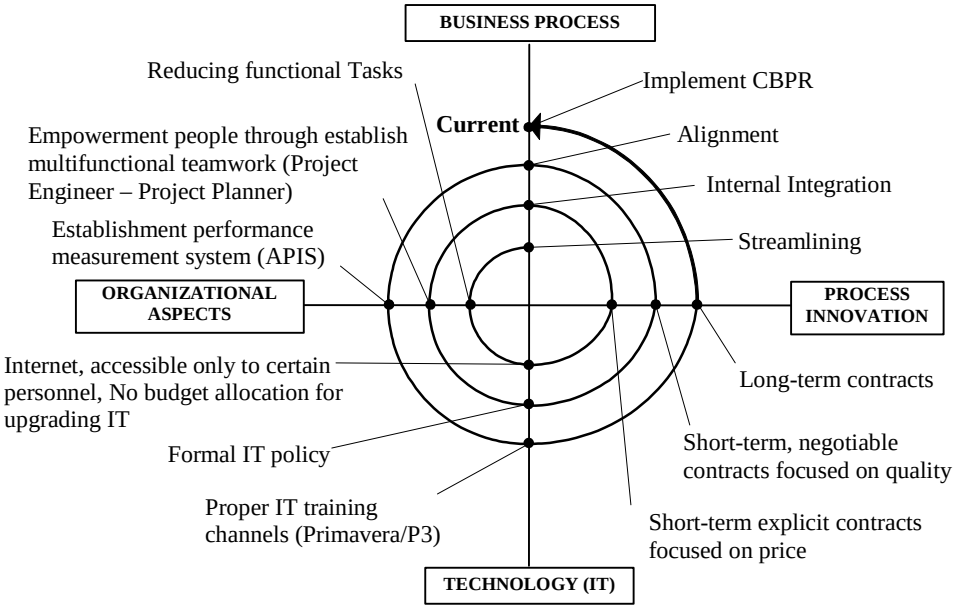

Figure 6. The business maturation spiral of construction organizations toward CBPR implementation

Maturation Spiral is proposed as integration of three key important element of CBPR, which consists of organizational aspects, process innovation, and technology (IT). The iterations of those key elements are required in order to mature the organization in applying and obtaining success by the concept of CBPR. The Spiral follows the assessment of each sampled cases, however, it does not end here. The need of continues adoption of BPR should be practiced prior implement CBPR so that breakthrough success can be achieved.

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